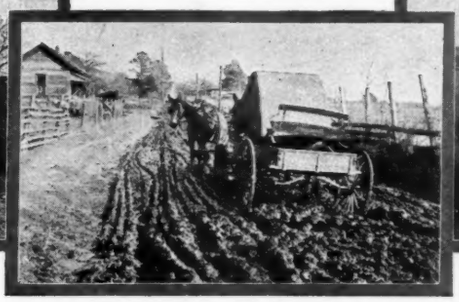
PUBLIC WORKS

CITY COUNTY STATE

Below: Typical spring condition of a soft surfaced road.

Harvester Road, St. Charles, Mo. "Tarvia-X," 1920



Carthage-Antwerp Road, N. Y. Another Tarvia Highway

Tarvia transforms old fashioned mud roads into all-year mudless, dustless highways—

PRESIDENT HARDING recently declared that the problem of distribution "is one of the greatest economic problems, if not the greatest problem, of modern civilization."

When we realize that it costs from four to ten times as much to haul a ton of goods over bad roads as it does over good roads, we see at once how vital this road problem is to all of us.

The question no longer should be, "Shall we have good roads?" It should be, instead, "How *quickly* and how *cheaply* can we get good roads?"

The Road Commissioners of hundreds of towns and rural districts throughout the country have found from experience that Tarvia pavements are the most economical good roads it is possible to build.

In first cost a Tarvia road is only slightly more than plain waterbound macadam. The upkeep of Tarvia pavement is, all things considered, so much less than that of any other type of lasting road that the saving—over a short period of years—will offset the original cost of construction.

Properly looked after, there is no limit to the life of a Tarvia road. With regular, but inexpensive maintenance, it is actually improved by time and traffic. Its easy-traction surface is smooth, firm, dustless and mudless all the year round—year after year.

Tarvia also offers an economical means of resurfacing old worn-out macadam, and of repairing and maintaining improved streets and highways of every kind. There is a grade of Tarvia for each of these purposes.

Illustrated booklets describing the various Tarvia treatments sent free upon request to our nearest branch.

Tarvia
For Road Construction Repair and Maintenance

New York Chicago Philadelphia Boston
Detroit New Orleans Birmingham Kansas City
Atlanta Duluth Salt Lake City Bangor
Milwaukee Toledo Columbus Richmond
Baltimore Omaha Houston Denver

The Barrett Company

St. Louis Cleveland Cincinnati Pittsburgh
Minneapolis Dallas Syracuse Peoria
Washington Johnstown Lebanon Youngstown
Latrobe Bethlehem Elizabeth Buffalo
Jacksonville San Francisco

THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S.

VOL. 52 NO. 23

Entered as second-class matter at the Post Office, at New York, N. Y., November 22, 1921, under the Act of March 3, 1879.
Published weekly by PUBLIC WORKS JOURNAL CORPORATION, 243 West 39th Street, New York, N. Y
Subscription price $3.00 a year, single copies 10 cents.

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 52 June 10, 1922 No. 23

Piers and Abutments of the Springfield Bridge

Construction of solid and hollow concrete substructure in sheet pile cofferdams. Storage and mixing of aggregate, distribution of concrete, and installation of contractor's plant for handling 54,000 yards of concrete and 110,000 yards of dredging.

The concrete arch bridge across the Connecticut river and the N.Y., N. H. & H. R. R., connecting Springfield and West Springfield, is 1,494 feet long over all, 80 feet wide and 56 feet high and includes seven arch spans varying from 176 to 110 feet long. It is being built by the County Commissioners of Hampden County for highway and streetcar traffic at a total cost of about four million dollars. Fay, Spofford & Thorndike are the designing engineers, and H. P. Converse & Co. is the principal contractor.

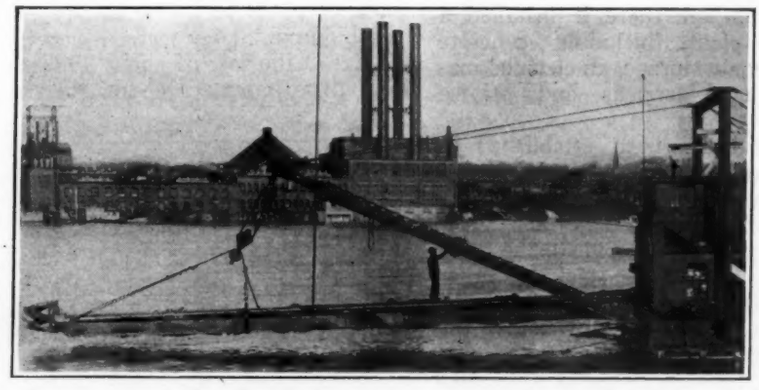
The superstructure consists of seven five-rib two-hinge parabolic one-arch river spans of reinforced concrete, and a viaduct with nine reinforced concrete floor slab spans over the adjacent railroad yard, as described in PUBLIC WORKS for May 20-27.

The substructure for the river section, which is 1,182 feet long, is of granite-faced concrete with wooden pile foundations built in wooden sheet pile cofferdams, constructed in pits dredged to a maximum depth of 25 feet below mean low water in the sand and gravel of the river bed.

The bridge was authorized by the legislature in 1915, but the final plans were not completed by the Special Bridge Commission until 1919. Active work on construction was commenced in April, 1920; about 90 per cent. had been completed February 1st, 1922, and it is expected that the bridge will be opened for traffic about the first of August next.

SPECIAL FLOATING EQUIPMENT

Supply scows, barges, derricks, lighters and other plants of suitable size could not be brought up the river because of the small size of the locks at Windsor, hence eight 18x75x7-foot scows or lighters containing 280,000 feet of Oregon fir were built at an improvised shipyard and launched. These were used singly for transporting materials from the Hampden Park yard to the bridge site, and two of them fastened together formed a lighter.



DREDGE FOR PIER EXCAVATING.

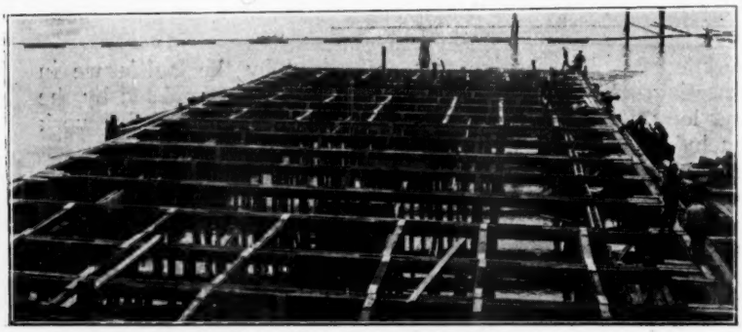
Gasoline towboats and lighters were brought by the contractor from a previous job at Norfolk, the lighters being so large that they were cut in two longitudinally, and sometimes transversely, passed

LAUNCHING SCOW NEAR BRIDGE SITE.

through the locks at Windsor, and finally bolted together again at the site.

By removing the side pontoons, cutting arms and other portions of a suction dredge, which had been designed for use on the Erie Canal, the hull with mechanical equipment was able to pass through the locks. Much of the smaller equipment, such as derricks, machinery, cars and tools was delivered to the site by rail.

In the contractor's principal yard at the West



COFFERDAM BRACED FOR UNWATERING.

Springfield end of the bridge there is installed a complete construction plant, including concrete mixer, cement and aggregate storage, an elevated material trestle, sheds, shops, derricks and service tracks.

A large material yard has been established at Hampden Park on ground reached by the Boston & Maine railroad, from which a spur track was laid for the transportation of plant and materials. Provision is made for receiving, sorting and storing there granite, structural steel, reinforcing steel and other bulky materials delivered by rail, where they may be transferred by a locomotive crane at a wharf on the river bank to scows which are towed about ½-mile down the river to the bridge site. This yard has also been used for casting 389 concrete piles for the viaduct foundations, as well as for the storage of 4,700 yards of cut granite, 3,500 tons of steel, 300,000 paving blocks, 3,000 linear feet of curb and 89,640 feet of conduits.

EXCAVATION

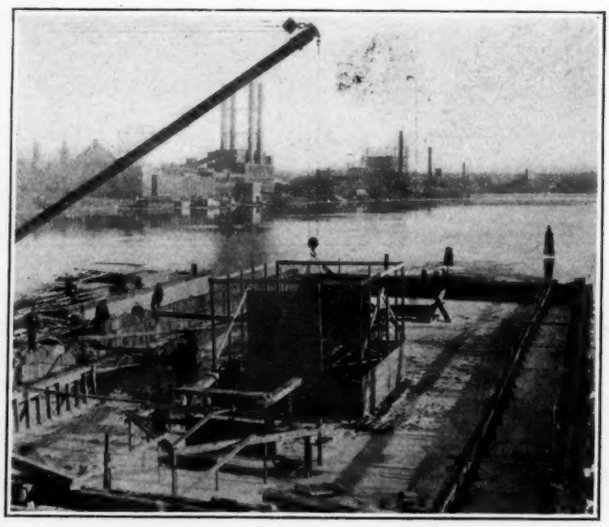
Excavation at the pier and abutment sites and the elimination of shoal places in the waterway required the removal of 110,000 cubic yards of sand and gravel that was pumped by a 12-inch suction dredge, provided with a revolving cutter head, at the rate of about 40 yards per hour, and delivered through a maximum of 2,000 feet of flexible-joint pipe. 12 inches in diameter, which was floated on pontoons, and discharged over the West Springfield meadows, where there was thus deposited a fill of 12 feet in maximum depth over an area of 4.2 acres, thus reclaiming valuable land. Besides dredging the areas of the pier footings, a zone across the river 250 feet upstream and 150 feet downstream from the center line of the bridge was dredged to a depth of 13 1/2 feet below low water, insuring the required waterway between the piers.

PILE DRIVING

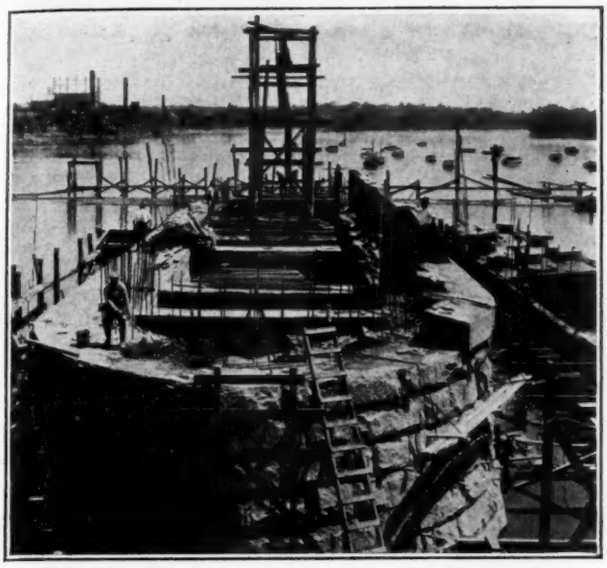
After the pier and abutment sites had been dredged to depths of 14 to 25 feet below mean low water level, two floating pile drivers equipped with Vulcan No. 2 steam hammers commenced the driving of the 10,500 foundation piles placed about 2 feet apart in groups varying from 700 at pier 1, to 2,263 at each of the channel piers, 4 and 5. The piles were of pine shipped from Delaware and Maryland and were from 20 to 40 feet long. They were driven with a follower operated in extension guides and had full penetration with the tops projecting from 6 to 18 inches above the bottom of the dregded area. The tops of the piles were driven to within one or two inches of the required elevation and the ends being uninjured by the follower, were not cut off after driving. The maximum number of piles driven by one hammer in a single 8-hour day was 110, and the average number driven per day by both hammers was 110.

COFFERDAMS

After the piles had been driven for each foundation, the group was enclosed by a cofferdam of 6-inch grooved and splined Douglas fir sheet piles, 36 to 38 feet long, shipped from the State of Washington. They were driven to a penetration of 22 feet at the rate of about 25 pieces per 8-hour day by a drop hammer. After the construction of the



BUILDING PIER FORM IN COFFERDAM.



CONCRETING UPPER PART OF HOLLOW PIER

piers, the cofferdams were removed and the sheet piles were pulled at an average rate of about 91 pieces per day by a floating derrick with a six-part tackle operated by a hoisting machine.

Gravel filling 6 inches thick was deposited around the pile tops in the bottom of the excavation and on it concrete was placed under water with bottom-dump buckets that retained it until the buckets touched bottom, thus preventing the cement from being washed out or the aggregate segregated by the action of the water. In this manner the footing was built up to elevation about 6 feet below low water level, sealing the cofferdam and practically completing the footing.

The interior of the cofferdam was braced by a system of intersecting longitudinal and transverse struts bearing against the sheet pile walings at about low water level, and forming rectangular pockets about 8 feet by 12 feet. The cofferdam was then unwatered by centrifugal pumps, one 6-inch pump sufficing to hold the water after unwatering.

The granite facing was laid up like ordinary ashlar masonry, one course in advance of the concreting, and served as a form to hold the latter in position. In the case of the hollow piers the concrete was placed around interior wooden forms acting as cores, which were accessible through manholes in the tops of the piers and were removed after the concrete had set.

The principal quantities involved in the construction of the six river piers included 108,600 yards of dredging, 7,980 wooden piles, 25,555 yards of concrete, 4,078 yards of granite, 15,440 tons of riprap and 2,091 linear feet of sheeting.

The skewback stones, of which there are 70 to receive the inclined bases of the pedestals for the arch ribs, are massive granite blocks built into the coping course and backed up with the solid mass of concrete. The faces of these blocks were dressed to exact planes after they had been set, in an average time of about 80 hours for each stone. All of the granite was quarried at Cape Ann near Gloucester, where the stones were cut and numbered, then shipped by rail to the Hampden Park storage yard and delivered to the site by lighters, as needed.

The operations for the construction of the abutments were similar to those for the piers and were carried on in wooden sheet-pile cofferdams, which, however, were not pulled. The voids left in the east abutment were filled with gravel and the foundations of both abutments and of all the piers were protected by riprap stones up to ten cubic feet in volume.

The cofferdam method of constructing the piers was selected by the contractor in preference to the floating caisson method, which was a permissible alternative and provided that the permanent concrete base of the floating caisson should rest on 4-inch soft wood planks that were expected to yield to the heavy pressure and adapt themselves to the irregular surfaces of the pile tops under the weight of the pier.

The principal quantities involved in the abutments were 885 linear feet of cofferdam, 9,580 yards of excavation and backfill, 8,315 yards of concrete, 622 yards of granite, 2,531 wooden foundation piles and 1,080 tons of riprap. The viaduct foundations consist of concrete piles supporting concrete bases for the piers and required 8,772 yards of excavation and backfill, 1,493 yards of concrete and 389 concrete piles. The West Springfield approach required 283 yards of excavation, about 140,000 yards of embankment, and 571 yards of concrete. The viaduct superstructure required 3,135 yards of concrete and 140.6 tons of structural steel.

Refuse Collection in New Orleans

Tractor and Trailer System Collects Refuse and Transports It Six or Eight Miles to Dump, Where It is Burned—Incinerator to Be Put in Service Soon

In New Orleans it has been customary for many years, when a leader in ward politics died, for his friends to provide by contribution, a dump cart and a mule which was turned over to the widow and hired by the city for the collection of garbage. The city had on its payrolls up to a year ago, about 150 of these carts, for which it paid $4.50 per day, which included the services of the driver.

This, known as the "widow's cart system," is being displaced by a new one, which has been in operation in about one-half of the city for about five months and which it is proposed to extend to the entire city. This is the tractor-trailer system, the equipment being owned by the city and operated by city employes.

In the new system, the collection unit is a straight-frame trailer with removable steel container of two cubic yards capacity, which is drawn by mules for house-to-house collection. When they have been filled, the trailers are hauled to designated points, where they are picked up by a truck or tractor and taken to the dump some six to eight miles distant. Here the steel container is removed by a locomotive crane and its contents spread on burning fires. This depositing on burning fires, which makes necessary

the use of steel containers handled by a crane, is for the purpose of complying with a regulation of the U. S. Public Health Service, which is conducting a campaign for bubonic plague eradication and insists that garbage and refuse shall be so treated to prevent the propagation of rats.

Disposal at these dumps involves operating two cranes, which, with the miscellaneous labor, costs about 50 cents per ton of refuse handled.

The dumping ground is a low, swampy area beyond the city proper. Previous to the inauguration of the tractor-trailer system, low areas within the built-up part of the city were used as dumping places, and were within economical hauling distance for carts and mules. But the tolerant attitude of the public to these unsanitary dumps has been giving place to indignant demands that the nuisance be removed beyond the city limits; although several of these dumps to which the objection is not so pronounced continue to be used.

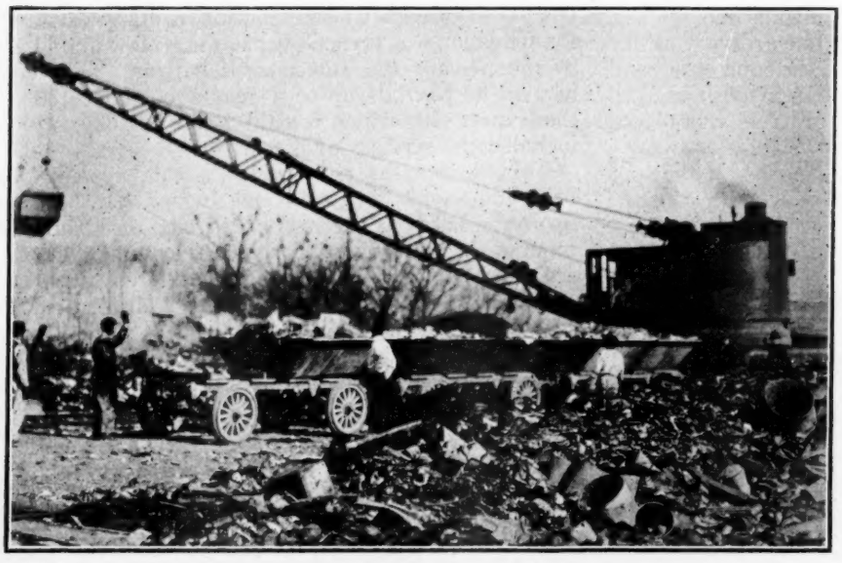
The new collection system is found to be a big improvement, in point of service to the public, over the old mule and cart and nigger driver, but there still remain some kinks to be straightened out, particularly loss of time due to imperfect synchronizing of the collection times of the several collecting units. Collections are made daily, winter and summer. The householder is not required to separate refuse or "trash" from garbage.

The method of disposal now employed is considered to be only a temporary one pending the erection of five incinerators that the city proposes to build. Contract has been let for one of these and money is available for two more. These three are to have a capacity of destroying 100 tons each of mixed garbage and refuse in 16 hours. The other two are planned to have capacities of 60 and 40 tons respectively. It is guaranteed that the incinerator will operate at a cost of 54 cents per ton for labor, exclusive of the cost of handling ashes, and that no commercial pull will be necessary if the rubbish content is not less than 30 per cent by weight of the material burned, which is about the proportion for New Orleans refuse.

The removal steel containers used on the trailers will adapt themselves to the contemplated incinerator operations, as they will permit storage of garbage within the incinerator building in a sanitary way.

Disposal by incineration seems to meet popular approval as well as being the conclusion reached by a committee of engineers who visited many cities in the East and North and who, taking everything into consideration, decided that disposal by incineration was the best solution of New Orlean's problem.

For the above information we are indebted to John Klorer, city engineer. The work is under the charge of the Department of Public Property, Engineering Division, Wilbert Black, commissoner.



GARBAGE BEING DUMPED ON BURNING AREA
Refuse already burned is shown in foreground

Sand Hog Work Less Dangerous

The work of the "sand hog," or laborer who excavates in compressed air as in sub-aqueous tunnels, is reported by the U. S. Bureau of Mines to be less dangerous than it was a few years ago. Observations made by Dr. Edward Levy, consulting physiologist of the bureau, during the progress of tunnel work in and about New York City, indicate that the methods employed there are so improved as almost to eliminate severe cases of compressed air illness.

Knowledge of the cause, character and treatment of compressed air illness is still limited to a very few physicians. The cause is a too rapid decompression after exposure to high pressures, and the symptoms are vertigo, difficult breathing, localized pains, affections of the central nervous system and unconsciousness or collapse. The formation of gas bubbles of nitrogen in the body fluids and tissues is the accepted theory at present of the cause of caisson disease. Men should be selected for such work that have normal lungs and kidneys and a good heart, and in the older men the blood pressure must not be high. The bureau questions whether older and fleshier men are especially susceptible to this illness.

A worker suffering from compressed air illness should be put in a medical lock and the pressure rapidly raised to that in which he had previously worked. It is well to keep him at this pressure for a short time to insure that the bubbles of nitrogen have been thoroughly compressed and again taken up by the circulation. The patient may then be decompressed again by the stage method, except that now the time should be double in every part of the decompression Although symptoms are frequently relieved before the pressure in which the man had worked is reached, it is safer to attain the original pressure before decompression.

PUBLIC WORKS.

Published Weekly
at 243 W. 39th St., New York, N. Y.

S. W. HUME, President J. T. MORRIS, Treasurer

Subscription Rates
United States and Possessions, Mexico and Cuba $3.00 year
All other countries..... 4.00 year
Change of Address
Subscribers are requested to notify us promptly of change of address, giving both old and new addresses.

Telephone (New York): Bryant 9591
Western Office: Monadnock Block, Chicago
A. PRESCOTT FOLWELL, Editor
FRANK W. SKINNER, Associate Editor

CONTENTS

Progress Report on Illinois Road Tests

The report on the second traffic run tests of the Bates Experimental Road, which was constructed last year by the Illinois Division of Highways for the purpose of making such tests, is to be considered as a progress report, and the conclusion, as in the case of all tests, should be interpreted with due consideration to the conditions under which the tests were made and the duration or number of such tests.

As stated a few weeks ago by the state highway engineer, the subgrade was not well drained, it being a question whether good drainage is practicable in the locality where the test road is located. This means inadequate support by the sub-base and excessive beam stresses in the roadway slabs.

One unexpected feature is the indication given by the night tests that the edge of the pavement is no more liable to break after the top has cooled off and contracted, causing the edge to rise off the subgrade, than it is during the heat of the day. For this the explanation is suggested that, even in the daytime, the edges of the slab may not rest on the subgrade because the latter has been depressed by the traffic that has already passed. This point, as well as others, will probably be investigated by further tests.

Refuse Dumps

Whatever its legal right, has a city a moral right to maintain a nuisance anywhere within its limits—or outside them? Most refuse dumps, as they are operated, are nuisances, and probably the majority of communities maintain or permit them until protests become so insistent that they are one by one discontinued—often by starting new ones further out. An instance is noted in an article in this issue, wherein it is stated that New Orleans is operating a dump several miles outside the city, most of those inside the city having been abandoned as a result of indignant protests.

The excuse is often made that the dump "must be placed somewhere," and the site chosen is generally in the section of low-value property, where the poorer classes live. A proper regard for these would treat them with even more consideration than the wealthier citizens with a view to improving them physically, morally and esthetically rather than further degrading them. With such a municipal institution as a dump at their doors instead of a park, with this offered to the children of the neighborhood as a playground, what chance have the uplifting agencies of the community in their efforts to improve the home life of these classes and their respect for the municipal government?

Even if the dump be placed in some section at present removed from all residences, houses of the poor soon spring up around it in most cases, not because they desire to be near the dump, but because it so depreciates the value of surrounding property that they can find cheaper homes here than elsewhere, and living cheaply is the most important consideration of their lives.

It is true that the refuse must be placed somewhere. It is also true that the city has no right to either depreciate the value of any property or degrade any of its citizens. If areas can be found already uninhabitable and useless for any other purpose, such as swamps, and sufficiently distant from inhabited areas, this offers a favorable solution unless the cost of haul to it is greater than that of sanitary disposal nearer the center of the collection area. Or a dump may be maintained in the center of a piece of land outside the city and of such size that surrounding owners cannot reasonably object.

But we believe that a dump can be maintained that will not be a nuisance.

Such a dump should not spread ashes and papers around the neighborhood:—surround it by a fence and this in turn by trees and shrubbery, which will effect this end and also conceal the dump from view. If necessary, sprinkle the ashes to prevent dust.

It should not emit odors:—Limit the amount of putrescible matter deposited there and have the caretaker spread it in thin layers and immediately cover it with ashes or soil. If there is too much garbage or too little ashes to insure this at all times, have the garbage burned with plenty of fuel (to maintain a high temperature that will burn all odorous gases) in a proper incinerator operated by faithful attendants. Prevent fire from starting in the fill itself, where it will smoulder and emit nauseous odors. The surest way to effect this is to burn all inflammable matter in the incinerator.

The wagons should not themselves be a nuisance in traversing the streets approaching the dump:—See that each is provided with a cover and that it is kept over the load at all times except when refuse is being emptied into it, and especially as it approaches the dump. Have garbage wagons with low sides so that pails can be emptied into them without soiling the outside. Have noiseless wagons, which may mean rubber tires and canvas or other non-metallic covers. Have the wagons cleaned daily and kept painted and in general give as much attention to them as to the apparatus of the fire department.

This will cost. But not really so much in money as in forethought and conscientious and eternal vigilance. A better grade of employes must be selected and trained to secure the ends aimed at. All concerned must learn to take a pride in the results and secure results they can take pride in, instead of performing a disagreeable task in any way that will give them the least trouble.

Such a dump can be leveled off and top soil applied, and the screen of fence and shrubbery moved forward from time to time, leaving behind it a gradually increasing area of park, or land that can be sold for building sites if no garbage or other putrescible matter has been placed in the dump. And if all resulting values and the costs be balanced, it seems that this plan as compared with present methods will be found very desirable considering the improved appearance and self respect of the community.

A Notable City Planning Project

What is reported to be the largest single piece of city planning by private enterprise ever undertaken in this country for permanent development is the Palos Verdes project in Los Angeles. This is for the construction of a new suburb similar in some respects to Roland Park, Baltimore, Forest Hills, Long Island and St. Francis' Wood, San Francisco, although much larger than these. It is proposed, however, to provide a greater proportion of low-priced homes and home sites. The ground secured for the purpose contains 16,000 acres facing on about 14 miles of ocean front at the southwest corner of the Los Angeles metropolitan area and opposite Catalina Island.

Preliminary estimates of the expenditure contemplated include $6,000,000 for 125 miles of concrete paved streets, $1,800,000 for sewers, $1,650,000 for the water system, $5,000,000 for the land, $1,300,000 for ornamental plantings, $2,000,000 for hotels and clubs, $2,000,000 for parks, schools and playgrounds, $3,000,000 for three civic centers with business blocks, $1,000,000 for a university, $4,000,000 for transportation, $5,000,000 for a home building fund and $2,250,000 miscellaneous; giving a total of $35,000,000.

The purpose of the home building fund is to finance the building of several thousand houses, arrangement for second mortgage loans being provided in the trust agreement, the title already being held to the land. It is proposed to use part of this sum for the organization of co-partnership housing, similar to that tried in England, in order to furnish working men's homes in quantity on easy terms and with maintenance and upkeep provided. No buildings can be built anywhere on the property unless the plans are approved by the art jury, which will be a permanent body endowed with sufficient funds to do real work.

The staff appointed to develop the project includes Olmstead Bros. of Brookline, Mass.; Charles H. Cheeney as city planner; H. T. Cory as chief of engineering; Hunter Liggett, supply service and Myron Hunt as chairman of the art jury.

Pittsburg Road Tests Renewed

The tests of the Pittsburgh (Cal.) highway, which we described in PUBLIC WORKS a few months ago, were discontinued on January 28th, the trucks having traveled altogether 75,000 miles carrying 3,668,100 tons for each section of the test road. This test was carried on by the Columbia Steel Co. Testing of the road is to be renewed by the California Highway Commission acting jointly with the U. S. Bureau of Public Roads. At the conclusion of these tests the commission and the federal bureau expect to start an entirely new series of tests on the same ground, which has been offered for the purpose by the owners, the Columbia Steel Co.

At the conclusion of the test last January all broken parts and timber patches were removed and the track was rebuilt with new concrete and when the tests were renewed recently the highway was believed to be in practically as good condition as when the tests were originally started last November.

Sheet Asphalt on Asphalt Macadam Base

During 1921 the Department of Public Works of Providence, R. I., constructed 22,584 square yards of sheet asphalt, a large part of which was laid on an asphalt macadam foundation. On those parts of the street between the car tracks and in other areas that would not receive very heavy traffic a 6-inch cement concrete foundation was used; but between the car tracks and the curb and on straight stretches a 6-inch asphalt macadam base was placed to carry the sheet asphalt.

This asphalt macadam base was constructed of 2-inch trap rock thoroughly compacted, to which Texaco asphalt cement was applied by four auto-truck distributors owned by the city, about 1¾ gallons per square yard being used.

Asphalt macadam pavement to the extent of 217,436 square yards was laid on the residential streets of the city.

At the tenth annual convention of the Chamber of Commerce of the United States, recently held in Washington, a resolution was passed requesting investigation by the government to determine what additional measures should be undertaken to safeguard the large area in the country now subject to destructive floods.

The construction of the 30-mile Ridge Route Highway in California cost $1,500,000 and it is conservatively estimated by State authorities that this road effects an actual saving to motor vehicle users of $6,000 daily, so that in the first year the road paid for itself.

The Illinois Road Tests

The second series of tests apparently indicate that slab corners are mutually supporting when the concrete expands; that night loading is no more serious than day loading; and that wider pavements are more durable than narrow ones.

The road constructed by the Illinois Division of Highways for test purposes, known as the "Bates Experimental Road" was described in the February 5th and 19th, 1921 issues of *Public Works*. The second of the traffic run tests on this road was completed on May 13th, when the 63 sections of the road had been subjected to 3,200 applications of the last increment of load.

The load which was applied to the pavements during this run was 3,500 pounds on each rear wheel of the trucks and 2,150 pounds on each of the front wheels. Three-ton Liberty trucks, with bodies attached, were used to produce the load, and brick piled in the body made up any deficit in weight. The loads as applied corresponded to 350 pounds per inch of nominal width of rear tire, and 430 pounds per inch of width of front tire. Though it was originally intended to apply this load only 1,000 times to each edge of the sections, it was later decided to subject the pavements to a greater number of applications in order that the thinner sections might be given a thorough test to determine their resistance qualities.

The load was first applied as in the preceding test, the trucks traveling on the extreme edges of the pavements. After 627 applications had been made in this manner it was decided to move the traffic in on the north side with the outside rear wheels of the trucks traveling 2 feet, 6 inches from the edge. The object of this was to study the results on pavements with the loads applied at a certain distance from the edge, it now being obvious that less damage would be done by a load at this position than at the edge. It seems entirely possible that the material necessary to construct a narrow, rigid slab of sufficient strength to carry given wheel loads, would, if used to construct a thinner slab of greater width, result in a pavement of equal or greater durability. Such a result would be due to the fact that wide roadways would in all probability lessen the frequency of the application of maximum loads to the weak points—the corners. Reasoning along this line, it is quite possible that added load-carrying capacity can be secured more cheaply by adding to the width of the pavement than in any other way.

CORNER SUPPORT BY EXPANSION.

After a total number of 1,167 applications of this load, it was noticed that exceptionally strong support was given the corners of the sections by the adjoining slabs. In other words, the pavement, due to prevailing warm weather, had expanded to such an extent that the loads were distributed across the joints, which contained no dowels, in the same manner as over joints that contain dowels. This condition eliminated to a great extent the free corners or weakest points in the slabs, and resulted in a greater strength of section than is normally the case during the late fall, winter and spring months. To prevent this condition, one transverse cut about one inch wide was made through each section of pavement of rigid type and the cut thus formed was filled with asphalt. The traffic was then started and 1,000 additional applications of the load made.

NIGHT TESTS.

Upon the completion of 2,167 applications of this load, night traffic was started. Preliminary investigations on the Bates Road showed conclusively that during the night the edges of rigid type pavements curl up and while in this position receive very little or no support from the subgrade. Pavements in the localities where night traffic is imposed upon them, especially in the vicinities of large cities, must necessarily withstand this extreme condition of strain and it was with this in mind and to gain an insight to the actions of various types of pavements subjected to this condition, that the night traffic on the Bates Road was introduced.

An electric lighting unit was installed at the test road in order to facilitate the night runs.

As the maximum curling of pavement has been indicated to take place between the hours of 9:00 p. m. and 6:00 a. m., the night traffic was applied during these hours. Fourteen trucks were employed in both the night and day runs with the 3,500-pound load, approximately 350 applications being secured in the day time and 300 at night. Due to an extremely heavy rain storm at midnight on the second night of the run, traffic was temporarily suspended and only 167 applications were secured at that time.

SUMMARY OF TESTS TO DATE.

Thus, up to date, the pavement has been subjected to:

One thousand round trips of the trucks loaded with 2,500 pounds on each rear wheel and 2,150 pounds on the front wheels, day time loads, the outside rear wheel running directly on the edge of the pavement.

Six hundred and twenty-seven trips with loads of 3,500 pounds on each rear wheel and 2,150 pounds on each front wheel, day time loads, outside rear wheel running directly on the edge of the pavement.

Five hundred and forty day time trips with the same load but with the outside rear wheel running directly on the edge on one side of the pavement and 2 feet, 6 inches in from the edge on the other side.

One thousand day time trips with the same load and with the trucks applying the load along the same line but with the joints of the pavement cut open.

One thousand thirty-three night trips with the loads applied under the same conditions as previously.

Observations of the effects of the traffic were made

PORTLAND CEMENT CONCRETE ONE CORNER FAILURE, APPARENTLY DECISIVE

in the same manner as in the first run on the road, observers being assigned to a certain number of sections to record all cracks and failures as they occur. Traffic breaks were considered failures.

A 3,500-pound load applied six inches from the corners of the thinnest (four-inch) rigid pavements produces tensile fibre stresses of about 500 pounds per square inch, considering the corners as unsupported cantilevers. As the test specimens cast of the same material and at the same time as the sections were laid had showed a modulos of rupture of from 600 pounds to 650 pounds per square inch, the actual stress produced in these sections is approximately 75 to 80 per cent. of the ultimate, and therefore corner breaks in all such sections might be expected.

This same load applied in like manner to five-inch rigid pavements produced tensil fibre stresses of about 300 pounds per square inch.

After the line of traffic had been changed from the edge to 30 inches in on one side of the pavement, there were no further failures on that side, but on the opposite side—resulting from applications of loads received after the line of traffic was changed on the one side—there were 14 corner breaks in all,

PRACTICALLY COMPLETE AND CONTINUOUS FAILURE ALONG WHEEL TRACKS

6 occurring before the joints were cut and 8 after the joints were cut. There is no doubt that the change of traffic prevented further failures on that side of the pavement.

That the opening of the cracks and joints, due to cold weather, makes a marked difference in the carrying capacity of a given pavement is shown by the results obtained from this test. Only two corner breaks occurred during the 1,167 applications of the 3,500-pound load before the joints were cut, but 7 corner breaks occurred during the following 1,000 applications of the same load applied after the joints had been opened.

Apparently the night loading was little if any more serious than the day loading, possibly due to the fact that the subgrade had been crowded away from underneath the edge of the pavement before the night runs were made, by the continuous applications of the truck loads along the edges. If this is the condition, the stress during day loading to which the slab was subjected would be as great as during night

COMPLETE FAILURE UNDER FIRST INCREMENT OF 2,500-POUND LOAD

loading, which would account for the fact that as a result of the 1,033 applications of the night loads, with joints open, only two additional breaks were observed, while as a result of 1,000 applications of day loads applied just previous and under the same conditions, six breaks occurred.

The next increment of load to be applied will be such that each of the rear wheels will carry 4,500 pounds, and each of the front wheels 2,000 pounds. The load on the front wheels is lessened under this load due to the increased weight in the rear taking some weight off of the front of the truck. One thousand or more applications of this load will be made in the day runs and there is some possibility of running the same number at night, this latter step to be considered after the completion of the day run.

BEHAVIOR OF SECTIONS.

Six of the sections were of bituminous-filled brick on macadam base. Four of these were considered to have totally failed after the passage of about 1,000 loads of the second increment, and two after about 1,500 loads.

Of the six sections of asphaltic concrete on macadam base, one showed no failures, one showed three, two showed six, one failed completely under the first increment of 2,500 pound load, and the sixth failed completely after the passage of 3,200 loads of the second increment of 3,500 pounds, which load is considered in excess of the capacity of this pavement.

Of the twelve sections of asphaltic concrete on Portland cement concrete base, three showed cracks through the curb, which it is thought may not be indicative of decisive failures; eight showed no apparent failures except two curb cracks in one section; and one showed one corner break, probably due to impact from the breaking of an adjacent corner, and a number of curb cracks.

Of thirteen sections of bituminous filled brick on Portland cement concrete base, there were no apparent failures in three; three sections had cracks in curb and base that were not considered decisive failures; two corner cracks that may not be decisive failures; and five sections in which cracks and corner breaks indicated decisive failures.

Of seven sections of brick constructed monolithic and semi-monolithic with Portland cement concrete base, three failed decisively on indicating that the critical load had been reached under the previous test; one with four corner cracks with progressive breaking, and one with a corner failure and two corner cracks. The other three showed surface cracks but not base failures.

Of 27 sections of Portland cement concrete, 21 showed no apparent failures, two developed corner failures that were apparently not decisive, and the other four suffered decisive corner failures.

Engineers' Plans for State Health Boards*

Regulations of the State Boards of Maryland, Massachusetts and Michigan, with respect to the matter and form of plans and reports required to accompany applications for water and sewerage permits

Maryland (Continued) *Sewerage.*—Plans showing all sewers are required; also profiles of each sewer show elevations of sewer and ground and station number at each manhole. "The elevation of sewer invert should be shown by a figure placed immediately below in a horizontal position, and the size and grade of the sewer, together with the character of the material of which the sewer is constructed, should be placed just below the invert line and parallel thereto, unless the sewer is large, in which case the information may be written above the invert line. The scale for profiles must be not greater than 40 ft. nor less than 200 ft. to 1 in. horizontal and between 4 ft. and 10 ft. to 1 in. vertical; preferably 100 ft. and 10 ft. respectively.

Detail plans are required of pumping stations, disposal plants, sections of sewers other than vitrified clay or cast iron, and all appurtenances.

There is also required a "complete report of the engineer. . . containing full information concerning the system and all its features," estimated cost; area to be served, the estimated population and estimated sewage flow, both present and future; with data concerning leakage, manufacturing waste, methods of disposal, description of disposal plant, etc.

Accompanying the instructions are general requirements as to the design itself—separate system generally necessary, minimum size, depth and grade of sewer, location and dimensions of manholes, etc. Vitrified pipe in 3-foot lengths is called for, and double strength above 12-inch.

Massachusetts.—"This department has no general rules or regulations relative to the preparation of plans for sewerage and water supply systems."

Michigan.—The Michigan law does not provide for the submission of plans for sewerage and water works until after the work has been done. Edward D. Rich, state sanitary engineer, says "In cities where high-grade city engineering departments are maintained we have no trouble because the work is carried on in conformity with good practice. We confer with the city engineers of such places on matters of general policy and ordinarily leave the details to their judgment. . . . We feel that our law is seriously defective, but under the circumstances we have done the best we could and have been really surprised that no more serious difficulties have arisen."

With reference to the plans showing completed work, the regulations of the board call for maps on a scale of 300 feet to one inch or larger, a tracing, blueprint or drawing on substantial paper. For sewerage they must show all streets and other physical features, schools and public buildings, and sewers; also areas that cannot be drained by gravity; also outlets, overflows and location of disposal works. Maps requiring sheets more than 24 by 36 inches may be made in two or more sheets. All plans must be submitted in duplicate and signed by the engineer and the authorities having the work in charge. Existing sewers should be shown in solid lines, proposed ones in broken lines; manholes by plain circles and flush tanks by circles filled in, and other appurtenances by appropriate symbols. Sizes and materials of sewers must be plainly marked and the points where the sizes change be clearly indicated.

Instructions as to surface and sewer elevations on the map are as in the Arkansas instructions. Elevations of sewer outlet, overflows, disposal works and high and low water of streams must be given.

Sewer profiles are not required but the department reserves the right to call for them. Details of sewers except standard circular sewers and of all appurtenances of special structures shall accompany the general plans, supplemented by the necessary explanatory notes. Drawings of disposal works must be in sufficient detail to give a clear understanding of the working of each unit, showing distribution

* Continued from page 386.

and drainage systems, automatic devices, sizes of filtering material, etc.

In addition to the map and plans, blanks supplied by the board are to be filled in for either sewerage or water supply. The sewerage blank calls for information concerning population, length of each size of sewer and material it is constructed of, number of manholes, flush tanks and other appurtenances, with the average distance manholes in sewers up to 24 inches in diameter and also in sewers over 24 inches; also descriptions of methods for ventilating the sewer system and flushing the laterals and the mains. Under the head of "Amount of House Sewage" are to be given the probable number of houses connected to the system, probable number not connected, number of office buildings and other business buildings and the percentage of these not connected, a list of the factories, railroads and other important industrial plants now connected and likely to be connected in the future; average amount of water per residential service and by each of the industrial establishments. Length of sewers below permanent ground water level and below temporary ground water level with kinds of joints used, with any data as to infiltration obtained by tests, statement whether rain water or any surface water is admitted to sanitary sewers, whether they are underdrained, by whom house connections are built and precaution to make them water-tight, the size of house connections, the average number of stoppages per year in sewers and in house connections that the department knows of and the chief cause of such stoppages.

Under the head of storm water run-off reaching combined sewers, information is asked as to the chief character of the surface drained, the formula or method used in estimating run-off, and location of each storm water overflow. In case sewage is pumped, give plans and complete description of pumping station, with sufficient data for computing yearly, daily and hourly rate of pumping.

Under the head of "Sewage Treatment," give the kinds of tank used and number of each kind, date of construction, daily quantity of sewage treated, average time in tanks, disposal of effluent and of sludge, volume of sludge per million gallons treated, frequency of emptying tanks, average depth of sludge and thickness of scum when emptied and a description of the method of operation of all alternating or dosing apparatus. If there are filters, give date of construction and describe process, net filtering area in acres, average area of bed in acres and number of beds, description of filtering medium as to quality and depth, average quantity of sewage treated per acre per day, length of dosing time and of resting time for each bed, method of caring for surface of bed and amount of material removed per year, and information as to crops raised if any. Under the head of "Final Disposal" is asked the name of the stream or other body of water into which the sewage is disposed, whether there is a dam across the stream and where located, an estimate of the low water width, depth of flow near the sewer outlet, details as to any probable future use of the stream for water supply, either above or below the sewer outlet.

In describing water supplies the following information is asked for: Population of city at present, date of installing plant and of subsequent extensions, description of any anxiliary supply for fire or for emergency use, and such use by industrial establishments. Under "Source of Supply," name all streams, drainage area above intake, approximate minimum flow, location of intake with reference to the drainage outlets of the city. If from a lake, name of lake, size in acres, average depth and area draining to it. If from an artificial impounding reservoir, area of water surface when full, maximum and average depth, approximate capacity, approximate quantity stored during low-water season, name of stream tributary and its drainage area, the average yearly rain-fall on such area and the nature of the area. Are there any camping or other semi-public grounds on the area? Is the bottom of the reservoir concreted or paved and if of earth, how was it prepared? What measures for protecting the supply from contamination. How often are reservoirs cleaned?

If the supply is from underground, number of wells and diameter and depth of each, character and thickness of the strata passed through by the wells with a description and depth of those from which water is obtained, kind of casing used for drilled wells or kind of walls and method of sinking in the case of dug wells, kind of strainer used, result of tests of yield that have been made, and a large scale map showing general lay-out of wells and other connections. If the supply is from springs or filter galleries or similar devices, the character and thickness of stratum from which springs apparently flow, results of any flow tests made of such springs, and a larger-scale map showing location of springs and of any possible sources of contamination and of works used in connection with connecting the springs to the distribution system. If there are any cesspools or other sources of pollution within 600 feet of the site of the supply, indicate all these on a map of the locality. If there are any salt or oil wells in the neighborhood likely to injure the supply give depth of salt-bearing stratum.

In case of purification, describe the process, future consumption used as basis of design, description of settling basins, kind and number of filter units, effective size, uniformity co-efficient and thickness of the filter sand, head of water maintained above sand, means for maintaining head, normal head of operation, maximum loss of head before filter is washed, means of indicating this loss of head, method employed in washing, capacity of filtered water reservoir and method of covering it. If chemical coagulant is used, means of dissolving it and maintaining solution of known strength, method of calculating coagulant necessary, description of joints where it is introduced and means of introduction. Are regular chemical and bacteriological analyses made and by whom? Does attendant make written record of operation of plant? If hypochlorite is used, date of installing apparatus, description of solution mixer, storage tanks, method of regulating flow, method of introduction into suction main, quantity used per million gallons and method of deciding this and of testing strength of chemical. Are there complaints of bad taste and if so under what circumstances are they most numerous? If liquid chlorine is used,

make and size of machine, point where chlorine is applied to raw water, average amount used per million gallons. If bad tastes have been complained of, under what circumstances? How often are bacteriological tests made to determine efficiency of sterilization and who makes them?

Under "Pumping and Distributing," information is asked concerning the type of pump used, the size or capacity, date of installation, present condition of pumps, suction lift, head pumped against and result of tests of pump slip. Size, length and kind of suction lines and of force mains. Total length of each size of pipe in the distribution system. Methods of preventing freezing of pipes carried on bridges or otherwise exposed. Total number of fire hydrants. Height and capacity of any elevated tank or standpipe, height above business section of city and above highest residence section. How is tank or standpipe covered and can it be cut out in case of fire. In case of a service reservoir, give shape, dimensions, capacity, height of water level above business section and above highest residence section and provision made for cutting out reservoir in case of fire and operating under direct pump pressure.

Water Works Convention*

Conclusion of description of the May convention of the American Water Works Association. Discussion on meters, check valves, pipe joints, pipe coatings, fire hydrants, tastes and odors, meter schedules, and other topics.

This was followed by a topical discussion on various subjects. Discussing the matter of check valves at meters, Mr. Sherman stated that at Belmont, Mass., gas burning under a hot-water heater had been left burning all night and the boiler blew up, and although the town had required a check valve at the meter it disclaimed responsibility for the explosion; the case being still in the court. Mr. Gwinn said that he preferred to burn out a $2 rubber disc occasionally rather than blow up a house and therefore objected to the use of check valves. It was reported that St. Petersburg, Va., requires check valves at meters. It was reported from Gary that meters there had been damaged by hot coils in furnaces which in winter created large amounts of steam; also that relief valves were thought desirable in connection with check valves but that a reliable relief valve had not been found, they usually corroding shut from long periods of non-use. It was also reported that in that city there had been numerous complaints by consumers who had been given bills for damages to meters by hot water. E. E. Davis stated that in Richmond he had used hot water meters and had found them not to be damaged by hot water; but Mr. Hawley stated that he had tested such meters and found them not reliable in the measurement of water.

The use of double check valves between public and private services was then discussed and Stephen H. Taylor of New Bedford stated that they had in use such valves ten years old, and that all such valves were tested yearly and that they had never yet found both the checks leaking. One member pointed out, however, that a long stick or piece of rope, such as they had found at times under one of the valves, might have been carried a little further and prevented both valves from closing. Mr. McInnes said that double checks could not be considered reliable without inspection and he felt that the responsibility was too great to trust to inspection which sometimes might fail, and that such construction was not allowed in Boston. Mr. Burnham stated that at the Conference of State Sanitary Engineers at Boston last year the conclusion was reached that such valves may be proper under certain conditions. W. C. Miller of St. Thomas stated that that city required a check to be placed wherever water was supplied to a building from an overhead tank, even though that tank was filled from the city mains, because of the possibility of pollution of the tank from the outside.

Discussing methods of constructing mains under railroads, J. E. Gibson described the practice of placing one pipe inside of another larger pipe which takes the vibration. At Gary the practice was said to be to place the pipes 8 feet deep beneath the rails, the additional depth of ground absorbing a large part of the vibration, and that they had had no trouble with pipes so laid. Mr. Hawley stated that at Atlantic City there had been no trouble with railroad crossings since leadite was used for joints.

Discussing the subject of lead substitutes for joints, Mr. Gwinn stated that he had tried leadite for a short time but had returned to the use of lead. However, most of those who spoke on the subject stated that they were convinced of the desirability of using such substitute. Mr. Hawley referred to 75 miles of pipe laid with leadite which had given entire satisfaction, the cost of such joints being 60 per cent less than that of lead during the war. Old joints had been dug up occasionally and had always been found in perfect condition. These mains were under pressures running up to 210 pounds and in pipes of sizes varying from 4 inches to 36 inches. He stated that it was desirable to use a pouring gate 8 to 10 inches high for satisfactory results. Mr. Gibson had used leadite for four years with entire satisfaction after he had got used to it. He found, however, that leaks in leadite joints, which were more or less numerous when the joint was first poured but which usually took up in a few hours or days, would not take up if the water was of a nature that would not rust iron, citing one experience with such water. Mr. Hawley cited one length of 7800 feet of 6-inch pipe laid with leadite and which was tested six months later when an opportunity offered and a leakage found of only .06 cubic feet in ten minutes. Another member stated that a 16-inch main laid under tracks which had given trouble by leakage had been caulked with leadite and leakage prevented; and that pipes laid over bridges with the joints in view and caulked with leadite had shown no leakage. G. G. Dixon told of 2000 feet of 10-inch pipe laid with leadite in February 1921 and when tested under 100 pounds pressure the metered leakage showed 500 gallons per day per inch per mile, which fell to 250 gallons and ten days later to below 200 gallons which was their specified limit. J. A. Jensen told of laying

*Continued from page 406.

some 6-inch pipe on top of the ground for temporary service during the tearing up of a street, part of this line being laid with lead and part with a lead substitute (not leadite), which line was in service 90 days, and while all the lead joints were dry only 2 out of 90 joints made with lead substitute were passable. S. H. Taylor told of a test of six pipes jointed together, three joints being made with leadite and three with another substitute, which line of pipe was lifted at one end while the other rested on the ground and the joints had developed considerable elasticity, and after this harsh treatment, the joints were still found to be tight. He had used leadite for three years almost exclusively and calculated that he had saved 75 per cent of the cost of joints.

In discussing the matter of location of fire hydrants, Mr. Bohmann of Milwaukee stated that in that city, water works and other municipal utilities were considered to have precedence over all private structures, and that if the city wished to put a fire hydrant at a corner where poles were located, the poles had to be removed.

In discussing the use of fire hydrants, Mr. Saville stated that they had found that a record of the year 1921 showed fire hydrants in his city used 74,500 times by the street department and only 171 times by the fire department and now were endeavoring to collect from the former department a considerable part of the cost of maintaining hydrants, which was about $4.75 per year per hydrant. It was stated that in St. Paul, stillson wrenches were used by contractors to the damage of the hydrants and that two crews of men were kept continually on the ground inspecting and repairing the 4,000 hydrants and that the cost of maintaining them was about $14 a year. A. B. Stiles stated that his city required contractors to install service connections with the water mains before starting the constructing of a building in order that such service could be used in the construction, and that contractors were not allowed to use fire hydrants. Mr. Gwinn stated that in his city all water used for street construction work was taken through a one-inch meter and charged for, the charge being $36, the regular schedule rate for water. Mr. Bohmann stated that his city discouraged the use of hydrants by contractors but could not refuse them; they were required to take out a permit and were loaned the wrench for opening the hydrant, which wrench was returned when their work was completed and their deposit recovered. He stated that they never yet had found that the fire department had failed to put out a fire because of any injury done to a fire hydrant by the contractor.

George E. Cripps, superintendent of the Water Works Repair Department of Rochester then read a paper entitled "Equipment and Shop Facilities for Maintenance of Water Works Systems," which was told in an entertaining way that caused considerable laughter but gave many valuable suggestions on the maintenance of water works. For instance, at one time he was called out at 2 a. m. by a serious break in a 36-inch main. Being by himself unable to close the valves controlling the ruptured section and realizing that it would require several hours to get his own men on the job, he called on the fire department for assistance in closing the valves. While speaking of valve closing he stated that the city owned a valve closing appliance attached to an automobile similar to that used in a number of cities. During the reading of the paper he showed slides of this and a number of other appliances. One among these which he especially commended to superintendents was a portable coal-burning boiler mounted on a light automobile truck, this boiler furnishing 60-pound steam which was used for a variety of purposes, such as thawing out fire hydrants, thawing snow over valve boxes and numerous other uses in winter, including use by the fire department for thawing frozen hose connections when reeling up the hose, thawing out extension ladders when lowering them after a fire, etc. The department now occupies with its shops a building 212 feet by 42 feet, adjacent to which is a pipe yard 350 feet long. The machine shop contains the latest facilities for metal working, including an acetylene welding outfit by means of which fire hydrants broken by automobiles have been mended. Mr. Cripps said that he uses leadite and swears by it. As an illustration of his statement that most anything could happen in a water works system, he cited the case of a service that was found frozen in July, explaining that the service lead into an ice cream manufacturing plant and had been laid next to an ammonia pipe which had started to leak.

P. J. Dooley advocated educating school children to a knowledge of the water works system of their city, not only for the benefit it would have when they grew up, but because of the immediate effect in their taking the information home to their parents. He arranged with the teachers of the public schools in his city to send the children to the water works plant, a class at a time, where they would be shown around the plant and have the various features explained to them. Another member stated that he also had children sent to the plant and the teachers required them on returning to write compositions describing what they had learned there. C. W. Newell commended this not only for its educational but also for its advertising feature, believing that if the water works department advertised itself and made as much noise doing its work as does the fire department it might be able to get appropriations from the city councils more readily.

"Present-Day Tars for Pipe Coatings" was then read by W. R. Conard, following which the topics printed in the suggestions for Superintendents' Day discussions were taken up seriatim. The first of these dealt with methods of preventing tampering with water meters. A paper on this subject was read by William W. Brush describing seals used in New York City furnished by the International Seal and Lock Co. which, although quite elaborate, it was learned could be tampered with in three ways. In fact, it seemed almost impossible to devise a seal that would absolutely prevent interference with a meter without detection.

Several members gave items of information from their own sections concerning the ownership of and payment for service pipes. Mr. Bohmann stated that in Wisconsin the public service commission does not give credit for services to a company where such services were paid for by consumers, even though the company claims ownership to them. Apparently the practice in the majority of cities is for the com-

pany to lay the services to the curb and the consumer from there to his property. In most cities the water company or department does not allow anyone to tap the mains except a representative of the company or department. St. Paul requires a consumer to pay for the service and to use the kind designated by them, and then guarantees the service for thirty years.

Discussing the subject of the cleaning or sterilizing of pipes before laying them or after they have been laid, Mr. Brush stated that in New York chloride of lime is placed in each pipe before it is laid in the trench. After a line has been completed, water is flushed through it and out of the nearest fire hydrant and water from the line is tested for B-coli, and the line is not put into service until such test is satisfactory. Following the break in the supply main across the narrows to Staten Island, when the pipe was filled with sewage-laden water from New York bay, a chlorine plant was established on the Brooklyn shore and chlorinated water was pumped through the repair main at the rate of 13,000,000 gallons a day, using 150 pounds of hypochlorite in ten hours and the water coming through the main was tested until it showed satisfactory freedom from bacteria.

FRIDAY SESSIONS

Friday morning's session was a joint one with the chemical and bacteriological section and was devoted to papers and discussions on chlorination and the removal of odors by aeration. Frank E. Hale, director of laboratories for the water department in Brooklyn, N. Y., described the excess chlorine method of plant control of chlorination. He recommended the use of .1 excess after ten minutes rather than .2 after five minutes. The excess chlorine method of control is now used, although previously the supply had been controlled by bacteriological tests.

William W. Brush read a paper entitled "Responsibility of the Water Works Superintendent to Prevent Tastes and Odors Due to Microscopic Organisms," in which he described the experiences of New York City in its efforts to eliminate tastes and odors, especially the rather serious ones that developed a few months ago. Copper sulphate had been applied in the aqueduct rather than to the large reservoirs, at the rate of 1 to 2 pounds per million gallons. This sometimes occasions some taste in the water, but this had been removed by chlorine. (Mr. Hale in his paper stated that the use of chlorine at .28 parts per million excess destroyed the cucumber taste contributed to Brooklyn water by algae.) Mr. Brush had not found that copper sulphate killed fish, but once or twice they had been smothered by large amounts of amorphous matter that collected on their gills, this matter being derived from the algae that had been killed by the copper sulphate. In the discussion on the matter of odors, Pat Gear told how a skunk had once been killed in the Holyoke reservoir and an hour and a half later they had to tell the telephone operator that the water works telephone was temporarily discontinued, as the taste seemed to have penetrated to all parts of the city. Mr. Hazen told of an experience with a reservoir which he did not name where the decomposition of algae that had been killed by copper sulphate produced taste results in the water that were very much worse than the original tastes.

The author of a paper scheduled to give further information concerning chlorine control at Grand Rapids was not present. Norman J. Howard read a paper describing recent practice in the removal of odors by aeration, filtration and other processes, and William J. Orchard described and illustrated by lantern slides some of the more recent developments in chlorination.

At this session the question was brought up as to the advisability of continuing the experiment made this year of having regular sessions of the convention on Friday. A vote by those present was almost unanimous in favor of the Friday sessions; although from the fact that the vote was taken at a Friday session it would seem to be natural that most of those present would favor it or they would not have been there.

The last session of the convention, on Friday afternoon, opened with the reading by Isaac Walker of the report of the Committee on Standardizing Meter Schedules, of which Allen Hazen was chairman. This was a preliminary report that it was hoped would bring out discussion by the members in order that final action could be taken next year. It was devoted largely to the slides in meter schedules. The report stated that the rates in some cities varied as much as 10 to 1 between the extremes which seemed to be highly undesirable. The schedule recommended by the New England Water Works Association and used by companies supplying two million people was recommended by the committee, it having been in use for six years. Each of the members of the committee of the New England Water Works Association that had recommended this standard was questioned and replied that he had no changes of any consequence to recommend. This schedule divides the consumers into domestic, those consuming up to 300,000 gallons per year; intermediate, those consuming between 300,000 and 3,000,000 gallons; and manufacturing or wholesale, consuming over 3,000,000 gallons. It was believed that the ratio between the domestic and the manufacturing rates should not exceed two to one. The use of the service charge in meter rates had been approved recently by the public service commission of New Jersey, Pennsylvania and California. Discussing this, Mr. Gwinn claimed that the use of a service charge encourages waste, since the charge for the water itself was so low as to be no deterrent, but most of the members apparently did not agree with him. Another suggestion which did not find any backers was made by Mr. Trautwine—that cities furnish free water to domestic consumers, the water being purchased wholesale from private companies for this purpose when the plant was not municipal.

Two papers were down on the program each entitled "Steel Pipe," but the author of only one of them was present, Theodore A. Leisen. The last paper of the convention was one by William A. Megraw, entitled "Design, Construction and Operation of a Balancing Reservoir." This was illustrated by lantern slides and explained the somewhat novel design of the plant. This paper we expect to present in PUBLIC WORKS shortly.

Water Works Services

Continuation, from the May 13th issue, of tables prepared from data furnished by superintendents of nearly eight hundred cities concerning meters, and the material, deterioration and clogging of services.

Note: In the table, ci. means cast iron; cl., cement lined; gi., galvanized iron; gs., galvanized steel; gwi., galvanized wrought iron; i., iron; ll., lead lined; s. steel; wi. wrought iron.

Municipality	Materials used for services.	Average life before renewal years.	Cause of deterioration.	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal.
Nebraska:					
Aurora	ci., g.	i., 30+	.....	no	.....
Chadron	l.	....	.....	no	.....
Fairbury	gs—no pav.	10	rust	no	renew
Fremont	l., g.	l.-20, wi.-22, g.-20	rust on i.; corrosion or chem. action of water on l.	yes	take up and clean
Gering	i.	....	ord. decay	no	.....
Hastings	l.	....	.....	no	.....
Lincoln	l. and g. (h)	18	rust, little elect.	no	.....
McCook	l.	....	.....	very little	.....
North Platte	l,	s., 7-10	rust and action bet. brass on goose necks and iron pipe	no	.....
Schuyler	wi. and l.	....	.....	no	.....
Sidney	g.	20	rust	no	.....
University Pl.	g.	15	rust	no	.....
New Hampshire:					
Berlin	s., wi.	22	rust	some	renew
Claremont	g., ll., cl.	g., 15-18; cl., 30	rust	with rust	relay new
Concord	wi., cl.	40	rust	yes	force pump and wiring out
Dover	wi., cl.	34+	outside by rust	some	put in new
Keene	s. and wi.	30	rust	no	small paper or wire
Lebanon	s.	20-25	rust	some	replace with new
Pembroke	s.	20	rust	only rust	renew
Portsmouth	wi.	15	rust	no	.....
New Jersey:					
Boundbrook	s. or wi.	30+	.....	no	.....
Bridgeton	l. and g.	12-15	rust	yes	take them out
Dunellen	wi.	....	elect.	no	.....
Freehold	wi.	formerly used s.-15	rust	no	.....
Hawthorne	s.	....	rust	no	.....
Hightstown	s.	12	rust	no	.....
Milltown	l.	formerly g., 4-6	rust and action of soil	no	.....
Nutley	wi., l. goose necks, brass corp. and curb cocks	20	corrosion	no	.....
Phillipsburg	g. wi.	15-25	elect., rust	no	.....
Ridgewood	ll. g.	g.-25	rust—plain g.	...	.....
Rockaway	g. wi.	20	rust	no	.....
New Mexico:					
Silver City	g.	20-30	rust	no	.....
New York:					
Albany	l.	50	elect.	seldom	force pumps
Amityville	g.	....	rust	yes	renew; run chain thru
Auburn	g.	25	rust	no	.....
Avon	l. and wi.	l. 50, wi. 20	.....	no	.....
Babylon	g.	25	rust	yes	.....
Baldwinsville	g. wi.	30-35	.....	no	.....
Brockport	wi.	....	rust	not often	relay service
Buffalo	i., g. or l.	20	elect., corrosion	occasionally	force pump
Canastota	l.	50	clog. w. hard water deposits	yes	.....
Catskill	l.	....	.....	no	.....
Clyde	g. wi. and l.	g., wi.-10	rust	no	.....
Corning	wi.	30-50	rust	no	.....
Cortland	ci. main wi. serv.	wi.-40+	elect.	no	.....
East Aurora	g., ll.	....	.....	little	air pressure
Elmira	l.—pav. sts., wi. elsewhere	wi.-40	rust	rarely	renew
Fairport	l.	....	.....	no	.....
Fort Plain	gs.	20-25	rust	no	.....
Frankfort	l.	i. (former)-25	rust	rarely	.....
Freeport	wi.	....	rust	over pitting	renewal
Geneva	l.	lifetime	.....	no	.....
Glens Falls	wi., l. connection	15-30	internal rust and stoppage by sediments in water	old serv.	tissue paper slugs and force pump; renewal
Gloversville	l.—formerly g.	g., 8-15	.....	yes	renew with lead pipe
Hamburg	s. and wi.	s., 15-25	rust mostly	no	.....
Hoosick Falls	g.	15-30	rust	some	.....
Hudson	l.	....	.....	no	.....
Hudson Falls	ci.	....	.....	...	.....
Ithaca	l., ¼" up—ci.	....	elect.	prac. none	.....
Jamestown	wi.	25	rust	seldom	force pump; wad of paper
Le Roy	wi.	16-18	rust	no	.....
Lyons	g., wi.	....	.....	...	.....
Middletown	brass and l. on pav.; wi. on others	wi., 15; others, 20-30	rust	no	.....

(h) Lead pipe across streets and alleys; galv. iron from lot line into building.

Table II—Water Works Services—Continued

Municipality	Materials used for services.	Average life before renewal years.	Cause of deterioration.	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal.
New York (Continued).					
Mohawk	g.	20	rust	no	.....
Mount Morris	wi., s.	30	rust	no	.....
Mount Vernon	l.; old-wi.	wi.-20	elect.	yes	renew with l.
New Albion	g., wi.	15	elect.	...	force pump
Newark	g., wi. and l.	20	rust gen., elect.	no	.....
New York	up to 2"-l.; 3" up-l., g. and ci.	g., 20-30 ci.-50	rust, little elect.	g.—yes	replaced with new
Norwich	gs.	20	rust	no	.....
Ogdensburg	g., wi. and g. ll.	25-30	rust	yes	renew
Olean	l. and g.	....	rust, elect.	no	.....
Oneonta	l. and wi.	l.-50 wi.-20	rust—wi.	no	.....
Ossining	l.	30+	.....	yes, at curb cocks	dig up and punch out corp. cocks; renew g. pipe from curb cock to bldg.
Oswego	l.	....	.....	no	.....
Perry	wi.	s.+ 6-10 26+	rust	no	.....
Rochester	l., g., ll.	....	.....	little	blow them out
Salamanca	gs.	10-15	rust	no	.....
Saratoga Springs	wi.	....	.....	no	.....
Scotia	l.	....	none	no	.....
Seneca Falls	g. wi.	g.-20	rust	no	.....
Sidney	g. and l.	g.-18	rust	no	blow offs
Syracuse	up to 1"-l.; over—g.	....	2 from elect.	no	.....
Tarrytown	up to 1"-l.; over, ci. or wi.	....	.....	no	.....
Wappingers Fls.	i. and l.	....	.....	no	.....
Waterford	wi. and l.	....	rust from outside	no	.....
Waterloo	wi.	8	elect.	no	.....
Watertown	g. wi.	15-20	rust	yes	relaying
Watervliet	l.	20	elect.	no	.....
Wellsville	wi.	25	rust and sediment	some	renewal
Westfield	wi.	25	elect. and rust	no	.....
Yonkers	l.	....	.....	occasionally	pressure pump
North Carolina:					
Canton	g.—serv.	g., 10-15	rust	no	.....
Greensboro	wi.	15-20	elect.	no	.....
High Point	g.	20	rust	little	.....
Lenoir	l.	....	.....	no	.....
Monroe	g., wi., l. goose-necks	20	rust	no	.....
Morehead City	wi. and l.	....	.....	no	.....
Mount Airy	wi. g.	18	rust	no	.....
New Bern	g.	10	rust	...	.....
Rocky Mount	g.	20+	rust	small serv.	renew
Salisbury	s.	15-20	rust	yes	renew small ones
Wilmington	g., l. connections	30	.....	yes	renew
North Dakota:					
Fargo	under 2"-l.; over—ci.	40+	sulphates in soil	no	.....
Grafton	l.	....	.....	no	.....
Valley City	l.	....	defective material	no	.....
Wahpeton	l.	....	.....	no	.....
Williston	l. and i.	i., 10; l., 25	rust	no	.....
Ohio:					
Ashtabula	s.	15	electrolysis	...	.....
Barberton	wi., l. gooseneck	....	.....	some	force pump
Barnesville	i. and l.	i.—10	.....	no	.....
Bryan	l.	....	.....	no	.....
Cambridge	wi.; now l.	10—15	rust	yes	wire
Cincinnati	l., ci., brass	....	.....	very little	.....
Cleveland	l. to curb; g. to house	1—40	g., rust; l., elect.	occasionally caused by small fish	force pump
Cuyahoga Falls.	wi. and l.	....	elect. and cinders	some	air; wire; digging up
Dayton	l. to prop. line, g beyond	wi—50	.....	no	.....
E. Liverpool	l.	....	.....	no	.....
E. Youngstown.	l.	....	.....	no	.....
Eaton	l. and wi.	30+	one case of elect.	no	.....
Franklin	l.	40—50	electrolysis	no	.....
Kenmore	l.	....	.....	no	.....
Lakewood	up to 1"—l.; up to 2"—wi.; 3" and up—ci.	....	electrolysis	no	.....
Lancaster	l. and i.	22	rust principally	slightly	open, blow out or muriatic acid
Lima	l.	....	elect., sewers settling	no	.....
Lorain	l.	....	electrolysis	no	.....
Marysville	i. and l.	i.—10	rust	some	renew
Medina	wi. and l.	20+	cinders eat away l.	no	.....
Middletown	l.	....	backing up of pipe across sewer ditches	no	.....
Mingo Junction.	s., wi., l.	s., 6; wi., 12; l, 15	l. and s.—rust; l.; wear and excessive pressure	no	.....
Montpelier	s. and l.	s—10	rust	no	.....
Newark	wi.	20	elect., rust	no	.....
New Boston	l.	....	electrolysis	no	.....
New Philadel'ia.	s.	....	rust	...	.....
Niles	l.	....	electrolysis	no	.....
Portsmouth	l.	....	electrolysis	no	.....
Sandusky	l.	25+	electrolysis	no	.....
Springfield	l. and g.	....	electrolysis	no	.....
Tiffin	l. to curb stop	....	.....	no	.....
Wadsworth	g., l. conn.	15	external corrosion	not recently	flushing
Warren	l.	35+	elect.; sew chocked up	...	relaying
Willoughby	g., l. gooseneck	....	rust	no	.....
Youngstown	l. to curb; rest—g	up to 50	natural deterioration	some	replace
Zanesville	l.	[illegible]	sediment	yes	.....

Table II—Water Works Services—Continued

Municipality	Materials used for services.	Average life before renewal years.	Cause of deterioration.	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal.
Oklahoma:					
Cleveland	wi.	10	rust	yes	air pipe
Collinsville	gs.—serv.; ci.—mains	s—2½	rust from outside	no	.....
Hartshorne	s., wi., l.	g. 5; l. 15	g—rust	no	.....
Holdenville	wi. and l.	11—15	rust	no	.....
Newkirk	l.	....	.....	no	.....
Sand Springs...	s.	....	.....	no	.....
Pennsylvania:					
Allentown	l. up to 2"; ci.—above	40-50	elect.; rust old ci,	no	.....
Bloomsburg	ci.	40	not generally	no	.....
Catasauqua	wi.	20	rust, elect.	no	.....
Chambersburg..	s., l. and g.	i., 35-40; s., 12-15	rust	...	renewal
Chester	l. and g.	....	rust	...	renew
Coatesville	l.	....	.....	no	.....
Connellsville ..	wi.	5-10	gases from coke cinders	very little	renew small lines
Coudersport ...	wi.	25	rust	no	.....
Corry	wi.	25-50	cinders	no	.....
Downingtown ..	l.	....	.....	no	.....
Duquesne	l.	20	electrolysis	yes	hand pump and wire
Elwood	l.	....	.....	no	.....
Emans	wi.	wi. 30	rust	no	.....
Hamburg	ci. and l.	lifetime	corrosion from ashes	no	flushing
Honesdale	ci., l.	....	rust	no	.....
Huntingdon ...	wi., g.	20	acid corrosion	no	.....
Indiana	ci.—large g., ll.—small	5-100 ci. 15-40 g., ll.	rust	some	.....
Jenkintown	l. to curb; g. to house	g. 20	rust	...	renewal
Jersey Shore...	ll., wi.	wi. 15	.....	yes	.....
Juniata	wi.	26+	rust	no	.....
McDonald	l.	26+	.....	no	.....
McKees Rocks..	l.	30	elect., frost, accidents	no	.....
Manheim	g.	15	rust	no	.....
Media	l. to curb	...	.....	no	.....
Meyersdale	wi.	25	elect., rust	not much	force pump
Millersburg	wi.	25-30	corroding and filling up	not often	take out
North East.....	l. and wi. g.	25	rust, corrosion	seldom	replace
Reading	l., wi., ci., ll.	...	rust	...	.....
Red Lion.....	wi., l., s.	wi. 30-60 l. 15-25	rust	no	.....
Reynoldsville ..	l., wi., s.	10-15		no	.....
Royersford	l. to curb, wi. to house; some s.	wi.-30 s., 12-15	l.-elect; rust, i. and s.	no	.....
Sayre	wi., s.	20 s.	.....	no	.....
Sharpsville	wi., ci.	10-12	s.-rust	yes	new serv.
Sykesville	l.	10+	lime in water	no	.....
Tamaqua	wi. and l.	wi., 15	no	not much	none cleaned
Tyrone	g. ll.	20	elect., rust	no	.....
Uniontown	l., l. to curb	l., 25-30 i., 7-10	rust elect.	yes	put in new ones
Warren	l., formerly g.	g.-18	corrosion	from corrosion	rebuilt or replaced with l.
Wellsboro	wi.	wi., 36; p., 10-15	rust	no	.....
Wilkinsburg ...	l.	....	deterioration of wiped joint; expansion of pipe due to water hammer or frost; too light pipe used	some	wire, paper, plug, shot, iron chips
Williamstown ..	ci.	....	corrosion	...	.....
York	l.	g., 14; l., 30	rust. elect.	no	.....
Rhode Island:					
Woonsocket ...	l.	35	.....	little	Put in new. Also dig corp. and stop and waste and force paper through
South Carolina:					
Anderson	l. under pav.; l. and i. unpaved	....	elect.; poor wiped joints	no	.....
Batesburg	g.	....	.....	no	.....
Bennettsville ..	g., l. goosenecks, brass connections	l.-10	corrosion	no	.....
Camden	g., wi.	20	rust	...	.....
Charleston	l.	....	elect.	some	clean corp. cock
Cheraw	g.	10+	.....	no	.....
Clinton	wi.	20	rust	no	.....
Easley	g.	....	.....	no	.....
Spartanburg ...	g.	....	none	no	.....
South Dakota:					
Aberdeen	l.	....	rust, i.	no	.....
Tennessee:					
Elizabethton ...	wi.	14+	.....	no	.....
Erwin	wi., g.	....	.....	little	replace
Greeneville	wi. and l.	wi., 25-30	rust; chemical action of water	no	.....
Lebanon	ci., g.	ci.-43, g.-20	rust	no	.....
Memphis	l.	....	.....	few cases	pressure pump
Newport	l., wi.	....	.....	no	.....
Shelbyville	l., ci.	....	.....	...	.....
Trenton	wi., l.	i.-20	rust	no	.....
Texas:					
Austin	wi. and l.	wi.-15	rust, leakage	not serious	.....
Big Spring.....	wi., ci.	20	rust	no	.....
Cleburne	wi., s., l.	i. and s., 10; l., 15	i. and s., rust; l., elect.	no	.....
Cooper	wi.	....	.....	no	.....
Dalhart	s., wi., l. cl.	....	.....	...	.....
Electra	g.	....	.....	no	.....
Hearne	l.	....	.....	no	.....
Henrietta	s. and l.	s., 4-10	rust	no	.....

Table II—Water Works Services

Municipality	Materials used for services.	Average life before renewal years.	Cause of deterioration.	Clogging of service pipes—Does it occur?	Clogging of service pipes—Method of removal.
Mart	ci., s.	s., 12-15	.....	no	.....
Paris	l., pav. sts; g., unpaved	....	i., rust	no	.....
Quanah	l.	....	.....	no	.....
San Antonio	g.	....	.....	...	.....
Smithville	wi.	10-12	rust	no	.....
Stamford	wi., l.	wi., 10-20	.....	no	.....
Sweetwater	l., ci.	....	.....	no	.....
Teague	l.	....	.....	no	.....
Texas City	g., wi.	12+	rust; some elect.	no	.....
Waco	l., perm. pav.; wi., others	wi., 15	rust; chemical in soil	yes	replace with new
Vermont:					
Barre	g., wi.	30+	rust	very little	force pump
Proctor	g.	24+	.....	no	.....
Springfield	g., wi.	....	.....	very little	.....
Virginia:					
Charlottesville	wi.	18	rust	yes	renew
Harrisonburg	g.	20	rust	very little	.....
Lynchburg	l., perm. pav.; wi., elsewhere	l.-20	elect., rust	...	hand force pump
Martinsville	s.	20	rust	not much	.....
Richmond	l.	25-50	earth action, occasionally elect.	very little	force pump
Staunton	g., wi.	....	elect.	no	.....
Washington:					
Seattle	g., wi.	25-35	elect.	seldom	force pump
Spokane	s., g.	50	elect., rust	no	.....
West Virginia:					
Charleston	g.	15-30	elect., filled land, loose soil or cinders	some	with heavy wire while pressure is on
Moundsville	l., wi.	20	elect., some bad ground, some bad pipe	some	run heavy wire through
Salem	wi.	10	rust	yes	take up and ream out
Sistersville	g.	15	elect., corrosion	yes	pump l. lines; discard g. lines
Welch	s. and l.	s.-12	rust and scale	yes	.....
Wisconsin:					
Appleton	l.	....	elect.	no	.....
Clintonville	l.	i.-12	rust	no	.....
Delavan	l.	s., 10-15 wi., 20-25	.....	no	.....
Fond du Lac	s. and l.	10	rust	no	.....
Fort Atkinson	l., s.	s-15	rust	no	.....
Green Bay	l.	wi. and g.-25	elect. on old g. and wi.	no	.....
Hartford	l.	wi.-10	rust	yes	dig up and clean with wire
Janesville	l.	wi.-12	rust	no	.....
Jefferson	l.	20+	.....	no	.....
Kaukauna	l.	....	elect. in one case	no	.....
Lake Geneva	l.	....	no	some	by filling pipe foot or two with bread and putting on pressure pump
Madison	l., up to 2" ci., above 2"	....	.....	no	.....
Manitowoc	l.	....	.....	no	.....
Marinette	gs. and l.	gs.,-25	rust and blowing out of lead connections	no	.....
Menasha	l. to 2" ci., larger	50+	.....	no	.....
Milwaukee	l. to 2" ci., larger	50+	elect. only	no	.....
Mineral Point	l.	....	.....	no	.....
Monroe	l.	....	.....	no	.....
Neenah	l., main to meter	wi., 3-10	city soil—pipes pit from outside	some	clean. corp. cock
New London	l.	g.-10	g.-rust	no	.....
Park Falls	wi. and l.	....	.....	no	.....
Platteville	l., brass connections	....	.....	no	.....
Plymouth	l.	....	elect.	...	.....
Racine	l.	....	few cases of elect.	no	.....
Reedsburg	s. and wi.	s.-15	rust	no	.....
Rice Lake	s.	20-30	rust	once in a while	flushing
Richland Center	l.	25	.....	no	.....
Shawano	l.	i., 10-15	rust	no	.....
So. Milwaukee	l.	20	elect.	no	.....
Sparta	ci., l.	....	none	yes	flush fire hydrants
Stevens Point	gs.	30	rust	yes	new service
Sturgeon Bay	l.	....	.....	...	.....
Superior	l., serv. in sts. g. or l. for others	l.-indef.	elect., rust	no	.....
Tomah	g., wi., gs.	gs., 12-15	rust or corrosion	no	.....
Tomahawk	ci.	....	.....	no	.....
Viroqua	l., s.	s.-10	rust	no	.....
Watertown	l.	unlimited	.....	...	force pump, bread and water
Wauwatosa	l.	....	none	no	.....
Wyoming:					
Cheyenne	l.	indef.	elect.	no	.....
Evanston	g.	30	rust	no	.....
Rawlins	l. and g.	10	i., rust	no	.....

NEWS OF THE SOCIETIES

CALENDAR

June 12—AMERICAN FEDERATION OF LABOR. Cincinnati, Ohio.
June 12-15 — CANADIAN GOOD ROADS ASSOCIATION. Ninth annual meeting. Empress Hotel, Victoria, B. C. (Change of date.)
June 13—ENGINEERING SOCIETY OF AKRON. Akron, Ohio.
June 15—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual meeting. Automobile Club of America, New York City.
June 16-17—ENGINEERING INSTITUTE OF CANADA. Provincial meeting. Vancouver Hotel, Vancouver, B. C.
June 19—AMERICAN CONSTRUCTION COUNCIL. Organizing meeting. Washington, D. C.
June 19-22—AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Summer meeting. Clifton Hotel, Niagara Falls.
June 20-23—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual convention. University of Illinois.
June 21-22—LEAGUE OF MINNESOTA MUNICIPALITIES. Annual convention. Crookston, Minn.
June 21-22—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Portsmouth, N. H.
June 26-30—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention. Niagara Falls, Ont.
June 26-July 1 — AMERICAN SOCIETY FOR TESTING MATERIALS. 25th annual meeting. Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.
July 12-14—NEW ENGLAND ASSOCIATION OF COMMERCIAL ENGINEERS. Exhibition. Auditorium Bldg., Springfield, Mass.
Aug. 15-18 — INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Fiftieth convention. Municipal Auditorium, San Francisco, Cal. Secretary, James J. Mulcahey, Chief, Yonkers, N. Y., Fire Dept.
Aug. 28-Sept. 2—NATIONAL SAFETY CONGRESS. Detroit, Mich.
Sept. 11-15—ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. New Auditorium, Cleveland, Ohio.
Sept. 12-15—NEW ENGLAND WATER WORKS ASSOCIATION. 41st annual convention. New Bedford, Mass. Secretary, Frank J. Gifford, Tremont Temple, Boston, Mass.
Sept. 25-28 — SOUTHWEST WATER WORKS ASSOCIATION. Annual convention. Hot Springs, Ark.
Oct. 9-13—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Cleveland, Ohio.
Oct. 16-19 — AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. Cleveland, Ohio.
Nov. 15-16—NATIONAL INDUSTRIAL LEAGUE. Annual meeting. New York City. Secretary, J. H. Beck, Chicago.
Dec. 7-13—NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING. New York City.

THE AMERICAN CONSTRUCTION COUNCIL

The American Construction Council, which will meet in Washington June 19-20, has been organized to bring together the many component parts which make up the industry, to analyze their common problems and provide a satisfactory solution for them.

Noble Foster Hoggson, New York, says: "The 250 national associations in the industry have discovered a considerable amount of duplication of effort and their inability to grapple effectively with the problems that extend beyond their own special fields. Each is ready and anxious to submit its common problems to an all-embracing organization which will strive for an elimination of duplication and waste and for more effective work. . .

"The first efforts of the Council will be devoted to:

"The formation of a code of ethics acceptable to the industry and to the public;

"The gathering of adequate statistics so that the industry may operate intelligently.

"A reduction of the national shortage of building mechanics and the establishment of the necessary apprenticeship system;

"A national study of building codes and the working out of a program for carrying the recommendations into effect;

"A revision of the existing freight rates on construction materials;

"A stabilization of the construction industry to mitigate the evils of seasonal employment and the trade migration of labor."

Other subjects under consideration at this meeting included, "The Need for a Universal Contract Form"; "The National Board for Jurisdictional Awards"; "National Construction Industrial Board"; "Construction Materials Forum"; "Estimate Guide Sheet, Standard Cost Finding System, Standard Form of Financial Statements, and Equipment Rental Agreement"; "Apprenticeship, and the Shortage of Skilled Workmen."

U. S. CHAMBER OF COMMERCE

The tenth annual meeting of the Chamber of Commerce of the United States was held at Washington, May 15-18. The keynote of the meeting was European conditions and their effect on American business, and it was addressed by President Harding, Secretary Hughes and Secretary Hoover. Officers elected were, president, Julius H. Barnes of Duluth, Minn.; vice-president for the Eastern States, A. C. Bedford of New York; for the Northern States, Thomas E. Wilson of Chicago; for the Southern States, Harry Black of Galveston and for the Western States, Thomas P. Stearns of Denver. Honorary vice-presidents elected were William Butterworth, Moline, Ill., and L. M. Gillette, Minneapolis.

CONFERENCE OF STATE SANITARY ENGINEERS

At the conference of State Sanitary Engineers held at Washington, D. C., May 16 and 17, C. A. Emerson, Jr., Harrisburg, Pa., was re-elected chairman; W. H. Dittoe, Columbus, Ohio; vice-chairman, and Theodore Horton, Albany, N. Y., secretary-treasurer.

THE ASPHALT ASSOCIATION

The following officers and directors have been elected for the ensuing year: President, Joseph R. Draney, U. S. Asphalt Refining Company, New York; Vice-President, F. P. Allen, Standard Oil Company of Indiana, Chicago, Ill.; Treasurer, Herbert Spencer, Standard Oil Company of New Jersey, New York; Secretary, J. E. Pennybacker, New York. Executive Committee: J. R. Draney, Herbert Spencer and LeRoy M. Law. Directors: Henry Fisher, Herbert Spencer, J. R. Draney, F. A. Hogan, J. S. Helm, E. J. Morrison, F. P. Allen, L. M. Law, L. M. May, G. H. Perkins, W. T. Headley, Charles Hvass, H. W. Wilson, B. F. Richardson and W. S. Ely.

During the past year the Asphalt Association has been expanded with the addition of about forty new members and by opening branch offices at Atlanta, with James R. Valk in charge as district engineer; at Raleigh, N. C., with Harry P. Grier as district engineer, and at Newark, N. J., with Frederic A. Reimer as district engineer. The Canadian office was moved from Toronto to Albany, N. Y., where Germain P. Graham was put in charge as district engineer. The association has maintained an office in Chicago with John B. Hittell in charge for several years.

In his annual report Secretary Pennybacker of the Asphalt Association declared: "In the face of the general business depression, asphalt paving had its banner year in 1921 with an estimated total yardage of 68,000,000, thus leading all competitors among the types higher than waterbound macadam. While it is generally believed that the asphaltic types make their gains largely in cities the Federal aid mileage of the bituminous types in 1920 was 602.7 miles. In 1921 the mileage was 1,018.3 miles, an increase of 415.6 miles or 48 per cent.

ENGINEERS' SOCIETY OF PENNSYLVANIA

The Engineers' Society of Pennsylvania has elected the following officers: president, T. E. Seelye, first vice-president, R. W. Moorehead; second vice-president, William Brown; secretary, Howard E. Moses, and treasurer, Harry T. Neale.

NEW YORK SECTION, A. S. C. E.

The annual meeting of the New York section of the American Society of Civil Engineers was held on May 17, at which was discussed regional planning for the New York district. The following officers were elected: president, J. Vipond Davies; vice-presidents, F. C. Noble and Charles W. Leavitt; secretary, H. M. Lewis, and treasurer, C. R. Hulsart. The new directors are W. G. Grove and W. C. Briggs.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

LARGER SIZE P. & H. CORDUROY EXCAVATOR CRANE

After nearly two years' service in the U. S. Government Reclamation Service, a larger size Corduroy Excavator Crane similar to Numbers 205 and 206, has been standardized upon by the Pawling and Harnischfeger Co.

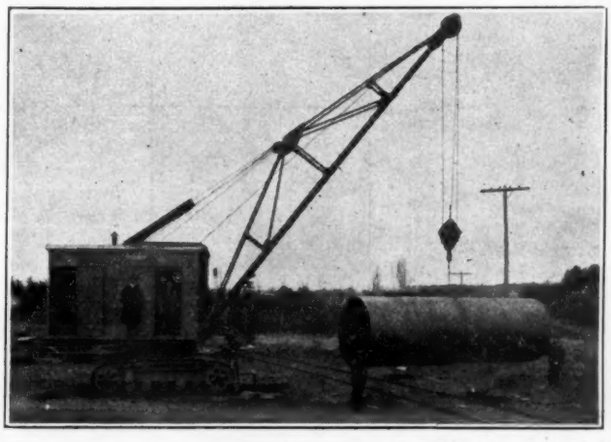
This machine is able to handle a 1-yard Page dragline bucket on a 35-foot boom, a 3/4-yard Page bucket on a 40-foot boom and a 1/2-yard Page bucket on a 50-foot boom. It will also handle clamshell buckets of from 1/2 to 1 1/2 yards capacity, depending upon the reach and the material handled. With but a few unimportant changes the 208 can be converted into a powerful gas shovel, handling a 1-yard dipper, and can be used with backfilling scraper, crane hook or electric magnet. This is the largest capacity machine that can be loaded onto a railway car to come within Standard Railway clearances without dismantling.

It is of the full revolving type mounted on full corduroy traction, is one-man operated and is of all steel construction. Turned shafting ground to size is used, heavy duty shafts being of forged alloy steel. The gears are all of steel, either cast or forged, with teeth cut from the solid. The corduroy tractions are of the P. & H. type, having driving and idler sprockets and treads of high carbon special treated steel casting. The link pins are of heat treated alloy steel forgings. The corduroys are of the self cleaning type and are completely accessible for inspection and renewals with a minimum of jacking. The ground bearing pressure is about 10 pounds per square inch.

By means of independent gear drives on each corduroy the following motions may be accomplished: One, high speed forward and reverse on both corduroys; two, low speed forward and reverse on both corduroys; three, high speed forward and reverse on one corduroy and a low speed forward and reverse on the other interchangeably; four, high or low speed forward and reverse on one corduroy with other corduroy running idle, interchangeably. All of these motions are controlled from the operator's platform regardless of the position of the revolving frame. The transmission gears move on spline shafts. This construction prevents the gears from sticking.

A 7¼x9-inch 75 H.P. heavy duty internal combustion motor running at 500 R.P.M. is gear connected to the jack shaft, the connecting gears running in an oil tight case. Outside band clutches connect the engine to the jack shaft and are used for the combined swinging and propelling shaft. Drums are mounted on separate shafts, the digging drum being provided with machine cut grooves.

The boom is hoisted and lowered by means of a drum operated by self locking worm and worm gear enclosed and running in oil. Operating levers are concentrated at the front right hand side of the machine, giving the operator full view of the work. The machine is completely enclosed by a sheet steel housing.



PAWLING & HARNISCHFEGER COMPANY'S CORDUROY EXCAVATOR CRANE

CORCORAN WIPE JOINT MACHINE

The Corcoran Wipe Joint Machine, sold by the A. T. Taft Manufacturing Company, has been designed by a water works specialist to fill the needs of municipal water works and master plumbers.

It is claimed to make a better, more uniform pipe joint than is possible by hand, because greater heat is possible,

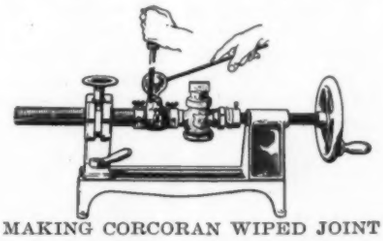
SECTION OF MACHINE MADE CORCORAN WIPED JOINT

and an absolute weld is always obtaintable.

Uniform thickness is also secured with freedom from waste, spoilage and loss of time.

Four wipe joints, each perfect in construction, may be made on this machine with unskilled labor while one is being made by hand.

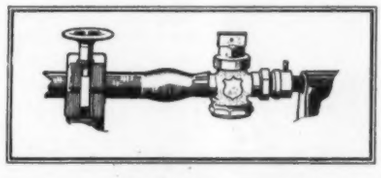
The Corcoran machine is easy to op-



MAKING CORCORAN WIPED JOINT

erate either in the shop or on the job and works equally as well on straight or curved pipe joints and makes a perfect joint in greater strength, uniform thickness and attractive appearance.

Warping, springing and ultimate leakage are eliminated and greater flexibility is secured through a perfect



FINISHED CORCORAN WIPED JOINT

wipe joint than is possible where couplings are employed.

A Corcoran machine joint has strength to resist a 1,000-pound longitudinal pull and an internal water pressure of 750 pounds.

Thousands of wipe joints have been made to date by the water works department of Cleveland with the Corcoran wipe joint machine.

NO. 56-H LITTLE DAVID CLAY DIGGER

Another substitution of mechanical methods for slow and costly manual labor has apparently been made in the case of a new air operated tool that does the work of ordinary hand picks. On many digging jobs in stiff clay and hard soil for trenches, shafts, tunnels, etc.,

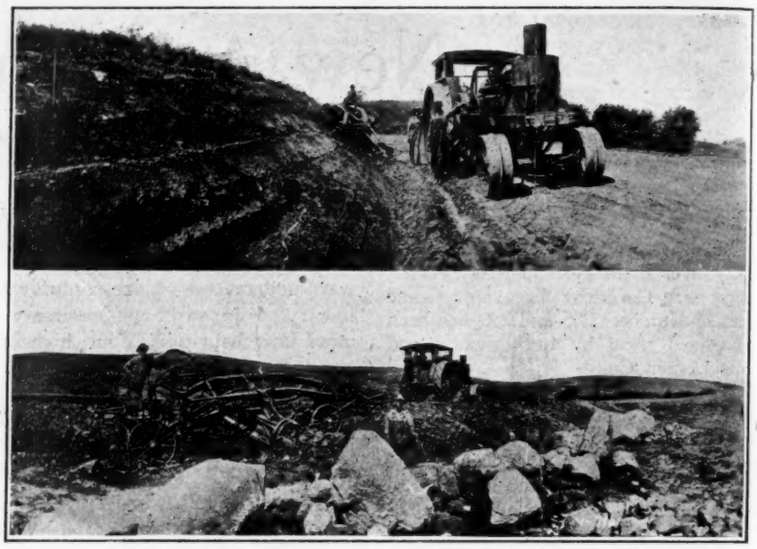
the ground is not hard enough to be drilled and shot and yet it is too hard to be removed with the ordinary hand shovel alone. Where a large power driven machine can not be worked the usual procedure is, of course, to employ men with hand picks to loosen the ground for hand shoveling. This new air tool has been developed to eliminate most of such hand pick work.

Ordinarily one shoveler serves one man with a pick. With one of these pneumatic diggers one man can generally loosen as much ground as five men with hand picks besides maintaining a more uniform rate of work with fewer pauses for rest. One man will loosen enough dirt to keep five shovelers busy all the while. The danger of accident from careless swinging of the hand pick is also eliminated so that the men are able to work close together in a trench or shaft.

The new compressed air operated tool is of fairly light weight (23 pounds complete), which a man operates while standing in an upright position. It is an air hammer, 34 inches in overall length, with a digging blade held in the nozzle end of the hammer. The blows of the hammer drive the blade into the hard ground so that it is pried loose. For clay the 6x8-inch blades are of a slight scoop shape. For earth they have a 5x9-inch rectangular flat face, 5/8 inch thick at the top and 5/16 inch thick at the bottom, with the cutting edge beveled from the back.

The throttle is conveniently located in the grip handle so that the air can be readily shut off as the tool is lifted from one position to another. A buffer is, however, provided inside the retaining nozzle to take the blow if the hammer is operated while the tool is being lifted.

This tool is manufactured by the Ingersoll-Rand Co.



AVERY TRACTOR HAULING ADAMS BLADE GRADER ON DIFFICULT SIDE HILL WORK

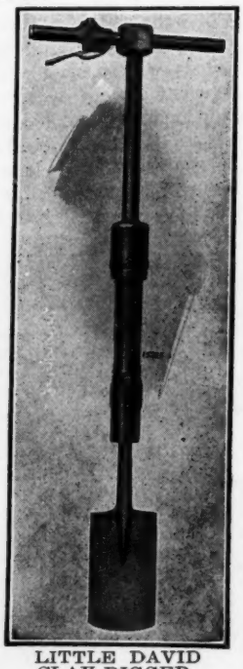
SIDE HILL MACHINE TRIMMING

A letter of May 11, from a firm of highway contractors in Britton, South Dakota, says: Regarding the work done by our Avery Tractor on Federal Aid Project No. 41, Marshall and Roberts counties, South Dakota, will say we bought this tractor in 1920. The first year it pulled an elevating grader; the next year, 1921, it pulled a 12-foot Adams blade grader. We find that a wheel tractor, especially an Avery, is well adapted for this purpose as it packs the shoulders of the road so that it becomes almost as hard as a pavement.

The photos show the Avery pulling an Adams blade on a back slope near Sisseton, South Dakota. We finished our back slopes in this way as it proved to be a great deal cheaper that way than any other way we could find. We also used the same machines for sloping the sides of our hills. This has the effect of producing nice, well defined and even shoulder lines, something the State Highway Commission is very insistent upon.

This particular job was the largest job let in South Dakota, being 25 miles long and not one particle of dirt could be cast in but must be hauled. It was all in the hills between Britton, South Dakota, and Sisseton, South Dakota.

INGERSOLL-RAND COMPANY'S LITTLE DAVID CLAY DIGGER IN OPERATION



LITTLE DAVID CLAY DIGGER, EXTENSION HANDLE

BUCYRUS COMPANY

This company has under way at the present time extensive enlargements to both its plants at South Milwaukee, Wisconsin and Evansville, Indiana.

These changes and rearrangements are planned to take care of their increasing volume of business and to enable them to manufacture more economically. In the South Milwaukee plant, where all the larger machinery is built, a new gray iron foundry, 276 feet in length, is now under construction.

The old gray iron foundry is being converted into a cleaning room with annealing ovens, sand blast rooms and a welding room. A large addition is also being made to the steel foundry moulding floor.